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ABSTRACT

Classroom observation data were collected from 32 presentations by 7 professors in the College of Medicine at Texas A&M University over the course of 9 months for a study of the potential of two-way television as an instructional medium. Half of the observations were made from two-way television mediated lessons transmitted from the Veterans Administration Hospital in Temple, Texas, to College Station, Texas, while the remaining presentations were made in a traditional manner with the professor present in the classroom. A classroom observation system based partly on Gagne and Briggs' events of instruction was developed to obtain low-inference data regarding instructional strategies used during classroom presentations. Cognitive achievement data associated with the course, Measurements in Medicine, were collected and analyzed with respect to the instructional delivery method and were compared with parallel data from students in a previous class who had received traditional instruction. Results indicated that similar instructional strategies were used by the professors regardless of the presentation mode, and that achievement was at least as high on materials presented over two-way television as they were on material presented with the professor present in the classroom. Seven references are listed. (Author/LMM)

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An Examination of Instructional Strategies Used with Two-Way Television

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An Examination of Instructional
Strategies Used with Two-Way Television

ABSTRACT

This inquiry was conducted to examine the potential of two-way television as an instructional medium. Classroom observation data were collected from 32 presentations by seven medical faculty. Half of the observed presentations were from two-way television mediated lessons, while the remaining observations were made in a conventional professor-in-front-of-class mode. Comparisons of observation data from these two presentation modes revealed similar instructional strategies by the professors regardless of the presentation mode. An additional analysis revealed test performances of students were at least as high on material presented over two-way television as they were on material presented by the professor being present in the classroom.

High aspirations have been held for several years regarding the promise of technology in educational settings. To illustrate, the Carnegie Commission on Higher Education (1972) forecast that by the turn of the century a significant proportion of instruction in higher education would be conducted through electronic informational technology. Yet, at present, the printed word is by far the most widely used technique for mediating instruction in higher education. Taking a more conservative stance, Rockhart and Morton (1975) suggest that technology will complement, rather than replace, current media by providing access to learners formerly outside the geographic limits of the regular educational system. Instances of this phenomena have begun to appear with the increased availability of telecourse packages (Richardson, 1981) and two-way television networks (Roth, 1981).

As applications of electronic technology become more prevalent in educational settings, one should pause to consider whether the applications are appropriate and effective or merely eye-catching and trendy fads which will soon disappear. Conceptually, educational issues which deserve attention regarding whether to invest in electronic technology such as two-way television networks include the characteristics of the instructional medium, qualities and needs of the learner, and the organizational structure of the curriculum. The influence of each of these factors on the instructional system as well as their interaction have provided the impetus for this inquiry.

OBJECTIVES

This inquiry was conducted to examine the potential of two-way television as an instructional medium with medical students. The nature of the curriculum is such that nearly 200 clock hours of instruction are delivered each year to medical students by faculty from the clinical campus approximately 85 miles away. It was anticipated that a number of these faculty would elect to present

a portion of their lecture-discussions using the two-way television delivery system via microwave communications rather than travel to campus for a series of multiple hour, vis-a-vis presentations with students. Further, the following objectives were developed to provide guidelines for this inquiry.

1. Compare instructional strategies and resources of faculty using both delivery systems. (two-way television and vis-a-vis presentations)

2. Compare cognitive achievement data of medical students on topics presented by faculty using both delivery systems, that is, two-way television, and vis-a-vis presentations.

PROCEDURES

Sample: Classroom observation data were collected on presentations by seven professors in the College of Medicine at Texas A&M University over the course of nine months. Given the scheduling arrangements half of the observations (16) were made from two-way television mediated lessons transmitted from the Veteran's Administration Hospital in Temple, Texas to College Station, Texas, while the remaining observations were made in a conventional professor-in-front-of-class mode on the central campus in College Station. Since faculty participation in this project was voluntary, findings from this inquiry should be viewed as tentative and not generalizable to other settings or faculty.

Instrumentation: The Classroom Observation System (COS) was developed and used to obtain low-inference data regarding instructional moves during class presentations. The COS is based in part on the events of instruction specified by Gagne and Briggs (1974). Coding conventions for the instructional events component as well as coding conventions for three other components of the scale, i.e., communication-oral, communication-behavioral, and media support were developed by the investigators. The COS is designed for use in a large group instructional setting with instruction directed and controlled by

a teacher. Observations of the class were recorded at one minute intervals across the four dimensions. This arrangement permitted monitoring of the type of activities occurring within each dimension over time as well as the interactions of one dimension with another. For example, the frequency of slides being used during a 15 minute stimulus presentation could be determined with this system as well as determining whether slides were used more extensively than other forms of media.

A variety of reliability measures were determined for the COS during its development and subsequent application. During a pilot study, interobserver measures of agreement were calculated to determine the extent of observer misunderstanding of category definitions and overlap of categories. Subsequently, eight classroom sessions were coded by a single observer and compared to determine the stability of instructional behavior across observations. These measures indicated that each component of the COS had one or more categories which applied to instructional processes occurring in the typical presentation format of college level instruction. At the conclusion of the data collection phase, six observations of a single presentation were made to determine the extent to which the coder was consistent with himself in applying the COS. The intra-coder agreement across the six trials of a brief presentation (10 minutes) was 1.00. This is not surprising since the video lesson being coded was relatively simple and the coder had used the COS extensively for nearly a year in coding actual class sessions. A sample coding sheet of this instrument is provided in figure 1.

place figure 1 about here

Instrumentation for objective two will be discussed in the findings.

Data Collection: Arrangements for classroom observations of live and two-way television presentations were made by the investigators. These

arrangements in turn were communicated to the individual who observed and recorded the observational data for all 32 sessions. The initial observation was made on March 22, 1982, while the final observation was recorded on November 13, 1982.

Information related to objective 2, cognitive assessments of participating medical students were gathered and items were sorted by medium used, i.e., face-to-face vs. television, and then compared.

FINDINGS

Objective 1: A variety of analyses was conducted on the observation data gathered during the course of this investigation. Bivariate tables were developed to compare the instructional strategies and media resources applied by faculty given live and telecast conditions. The results of these comparisons are presented in table 1. One comparison among the events-of-instruction turned out to be significant, i.e., presenting-stimulus material. The remote transmission mode or televised presentation in this comparison registered a greater frequency of time intervals in the high range of occurrence (67-100% of class time) than occurred during live presentations, reflected by the chi-square comparison, $\chi^2 = 7.7$, $p < .02$. The remaining events of instruction, i.e., reviewing prerequisites, providing objectives, providing learner guidance, providing opportunities for learner performance, providing feedback, and assessing performance appear to have occurred with similar frequency whether the presentation was live or telecast. Comparisons of media supports used during these observations revealed similar patterns across classes which were presented live or telecast. Approximately equal proportions of usage of the chalkboard and slides

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place table 1 about here

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were noted with use of text revealing slightly unequal dimensions but not

statistically different proportions given different modes of transmission. The only comparison under the classification, media support, which differed to the extent the chi-square value ($\chi^2 = 10.67$, $p < .01$) was significant occurred for the entry, not-using-media. The incidence of time intervals where media was not being used was greater during live instruction than in the remote mode.

Each observation was examined for recurring instructional patterns. These analyses are presented in figure 2. The number of instructional moves varies considerably across these observations. The plots for each observation begin with the event-of-instruction noted at the top of the plot. The length of the line represents the duration of time spent on that event. For example, the plot of the observation of professor 01 on March 25, indicates the presentation began with a 12 minute presentation of stimulus material followed by one minute of learner performance, 8 more minutes of stimulus presentation, and concluded with 2 minutes of learner performance and feedback. The recurring instructional pattern for this observation was the presentation of stimulus information followed by a brief question and answer period (learner performance). This pattern occurred three times during the course of the class.

The initial event in the remaining observations of professor 01 consisted of either reviewing prerequisites or stating the objective for the class. After reviewing past content, professor 01 generally proceeded with the presentation of new material, stopping periodically to clarify and check on learner understanding of the material. Instances of learner performance occurred throughout all but 2 of the observations for professor 01 and feedback usually was provided in conjunction with learner performances (student responses to questions). The length of the presentation-learner performance-feedback instructional cycle varied considerably across the observations, ranging from 3 minutes (3/25) to

36 minutes (4/8). It does appear, however, that the length of the periods of stimulus presentations (SP) tended to be greater during the remote classes (see classes of 4/8 and 4/29) than during live presentations with notable exceptions on 4/1 and 5/20 for professor 01.

In contrast, consider the events-of-instruction recorded and plotted for professor 06. The instructional pattern, whether live or remote, was nearly constant across eight observations; that is, professor 06 began, continued, and closed his class with the instructional event stimulus presentation. Two exceptions, however, did occur during the live presentation of professor 06. In one case, professor 06 began his class by providing the objective for the presentation; in the second case, the class was concluded with a response or comment by a student. Otherwise, the presentations of professor 06 were constant with respect to the events-of-instruction being applied.

Observations from the remaining professors (02, 03, 04, 05, 07 and 08) were limited; thus, identifying recurring instructional cycles was not possible. However, as a means of examining the classes observed, comparisons were made among the observations of the remaining professors. For example, professors 03 and 07 appear to have elicited learner performance more frequently than professors 02, 04 and 08. Identification number 05 represents a team teaching situation where professors 02 and 03 conducted the class. It is apparent that in these observations a good deal of discussion (SP/PER/FB) occurred. Whether this discussion is typical of a team teaching situation among medical faculty remains to be verified with additional observations.

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place figure 2 about here

Figure 3 is organized in a similar fashion to figure 2 with the plots representing which media supports were used during the class. To illustrate,

the plot for 3/25 indicates professor 01 used text (handouts) exclusively during the class. Examining the remaining observations for professor 01 indicates he tended to open class without media support while presenting the objective for the class. Further, it appears professor 01 favors the use of text (handouts) and slides as media supports since both were used extensively across the 14 observations of him. In contrast, the chalkboard was used less frequently, occurring during five observations. Additionally, professor 01 tended to shift to different media supports more frequently during televised presentations than when presenting in person.

Professor 06 relied on slides to support and supplement his lecture in five of eight observations. Additional media used by professor 06 included the chalkboard during three sessions and a film in one session. In addition, professor 06 tended to rely on various media supports early in the presentation and concluded without use of media.

As mentioned previously, patterns for the remaining observations are not possible due to the limited number of observations for each professor. However, professor 03 initiated class with a film, while professor 04 began immediately with slides, and used this media support solely throughout the class while presenting stimulus material. Professors 07 and 08 began their presentations without media supports but soon initiated the use of slides or handouts and slides. In contrast, the team teaching observations (05) reveal an extensive number of media shifts corresponding to the shifts in instructional events. In summary, it appears that the use of media whether live or with television appear to be linked primarily to the content being presented and the preference of the professor.

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place figure 3 about here

Objective 2: Cognitive achievement data associated with the course, Measurements in Medicine (M.Id. 489), taught during the spring 1982, were collected and analyzed with respect to the instructional delivery system used to present the information to the students. These data were also compared with parallel data collected from students who completed the same course a year earlier (spring 1981) but received all their instruction with the professor present. As an initial step, the 1982 test data were content analyzed to determine whether the content of the test items had been presented in a live or remote class. Once the test items related to content presented in a remote class were identified from the 1982 data set, corresponding test items from the 1981 data were also identified. Descriptive values of student performance were then determined for the total tests (mid-term, final) and two-way television related subsets of test items (mid-term, final) for the cohorts. These values, reported in table 2 reveal no significant differences among any of the comparisons between the two classes. In each case, the success score on items taught via television remained essentially the same for these groups despite the slight drop in performance of the 1982 group in the final test. Thus the 1982 students did at least as well on the material presented on interactive television as they did on items presented by the professor being present in the classroom.

place table 2 about here

DISCUSSION

The aforementioned analyses which compared instructional strategies and resources of faculty using both live and television delivery systems reflect common skills being exhibited and similar resources being used with few exceptions. Tests of significance revealed different levels of emphasis for one event-of-instruction, stimulus presentation, when the presentation medium changed from

the live to the remote mode. The televised mode registered a greater number of time intervals of stimulus presentation in the high range of occurrence than were recorded for the live mode. Whether this emphasis on presenting information is a "good" or "desirable" practice for two-way television is a moot point if we expect to find justification in the literature on instructional applications of two-way television, since this type of comparison has not been reported. However, Williams (1978) has reported that for teleconferences, tasks, such as, providing information and generating ideas are well suited for two-way television. If this observation regarding teleconferences holds for instructional applications, then our finding is compatible with desirable practices. Yet, as we review the plots (figures 1 and 2) of the various professors, we are struck by the influence that one professor (06) had on these findings. Due to the disproportionate number of observations of stimulus presentation in the televised mode, compared with live presentations for professor 06 and the fact this individual relied almost exclusively on one instructional event, stimulus presentation, we can conclude that the number of observations/professor and the characteristic instructional cycle of that professor resulted in the observed statistical differences in this case.

Essentially, the same causal argument may be used to explain the one difference reported for media supports. In this case, not-applying-media was most frequently observed for professor 06.

Examining other time plots of individual presentations did reveal some differences of instructional strategies and media supports depending on the nature of the delivery system and the apparent style of the professor. Our review of the instructional technology literature suggests that low-inference instruments have not been used extensively in this type of investigation. Ironically, of the data collected in this investigation, observations obtained from the analysis of individual presentations have generated greater thought and hypothesis

generation than the sample statistics across the observations. Thus, we encourage the use of low-inference observation scales in subsequent efforts designed to explore the efficacy of two-way television in various instructional settings.

The second comparison addressed in this inquiry is frequently noted in media research. In this case, cognitive achievement data associated with in-person and two-way television presentations were isolated and compared. The findings that student achievement was not influenced by the delivery system is consistent with much of the research literature or media comparisons (Winn, 1979). Winn's concern that the unique capabilities of media, in this case two-way television, were not specifically integrated into the presentations is highly probable since instrucional strategies and media supports across both presentation modes were very similiar. Our findings support the recommendation that cognitive performance by this group of medical students certainly was not hampered by mediated instruction and given other considerations (travel, time) may be a viable option for presenting information to students at a distant site.

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Class Observation Sale

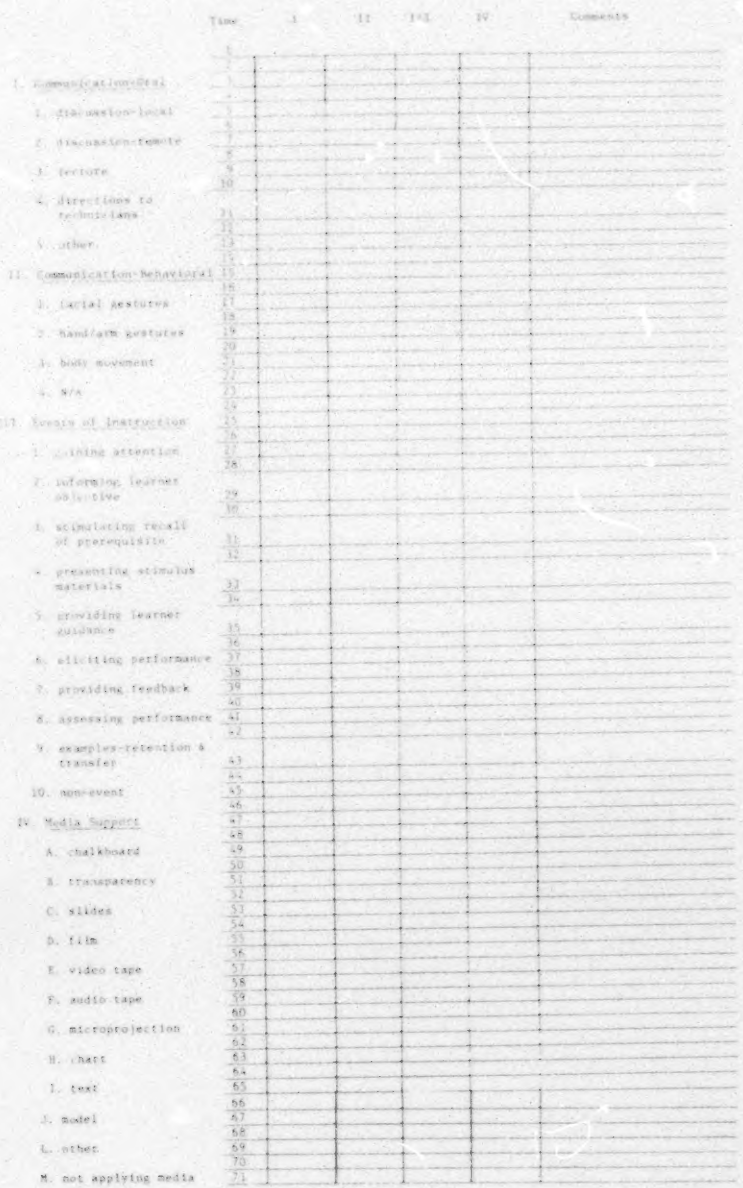

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Table 1

Comparisons of Live and Remote Presentations
Across Instructional Events and Supporting Media

I. Events of Instruction	Range* of Occurrence	# of Presentations by Mode		Variance	Test of Significance
		Live(/)	Remote(t)	(s)	
Reviewing Prerequisites	L	16	16	-	N.S.
	M	0	0		
	H	0	0		
Providing Objective to Learner	L	16	16	-	N.S.
	M	0	0		
	H	0	0		
Presenting Stimulus Material	L	2	0	23	Sig.
	M	6	1		
	H	8	15		
Providing Learner Guidance	L	16	16	-	-
	M	0	0		
	H	0	0		
Performance by Learner	L	15	16	3	N.S.
	M	1	0		
	H	0	0		
Feedback Provided to Learner	L	14	16	7	N.S.
	M	2	0		
	H	0	0		
Assessing Performance During Class	L	16	16	-	N.S.
	M	0	0		
	H	0	0		
II. Media Support					
Chalkboard	L	14	16	6	N.S.
	M	1	0		
	H	1	0		
Slides	L	11	12	-	N.S.
	M	3	3		
	H	2	1		
Text	L	4	10	9	N.S.
	M	7	3		
	H	5	3		
Not Using Media	L	16	8	29	Sig.
	M	0	3		
	H	0	5		

* Range of Occurrence (Relative frequency of codes/category in a presentation):

L = 0 - 33%
M = 34 - 66%
H = 67 - 100%

Table 2

Test Performance Comparisons on Two Cohorts of Medical Students in the Course-Measurements in Medicine

	Cohort Test Performance	
Midterm	1981	1982
	X	Y
total test	97.63	94.87
*ITV subset	98.13	98.07
Final		
total test	92.63	91.83
ITV subset	97.92	97.85

*ITV subset = test items over content presented by interactive television mode.

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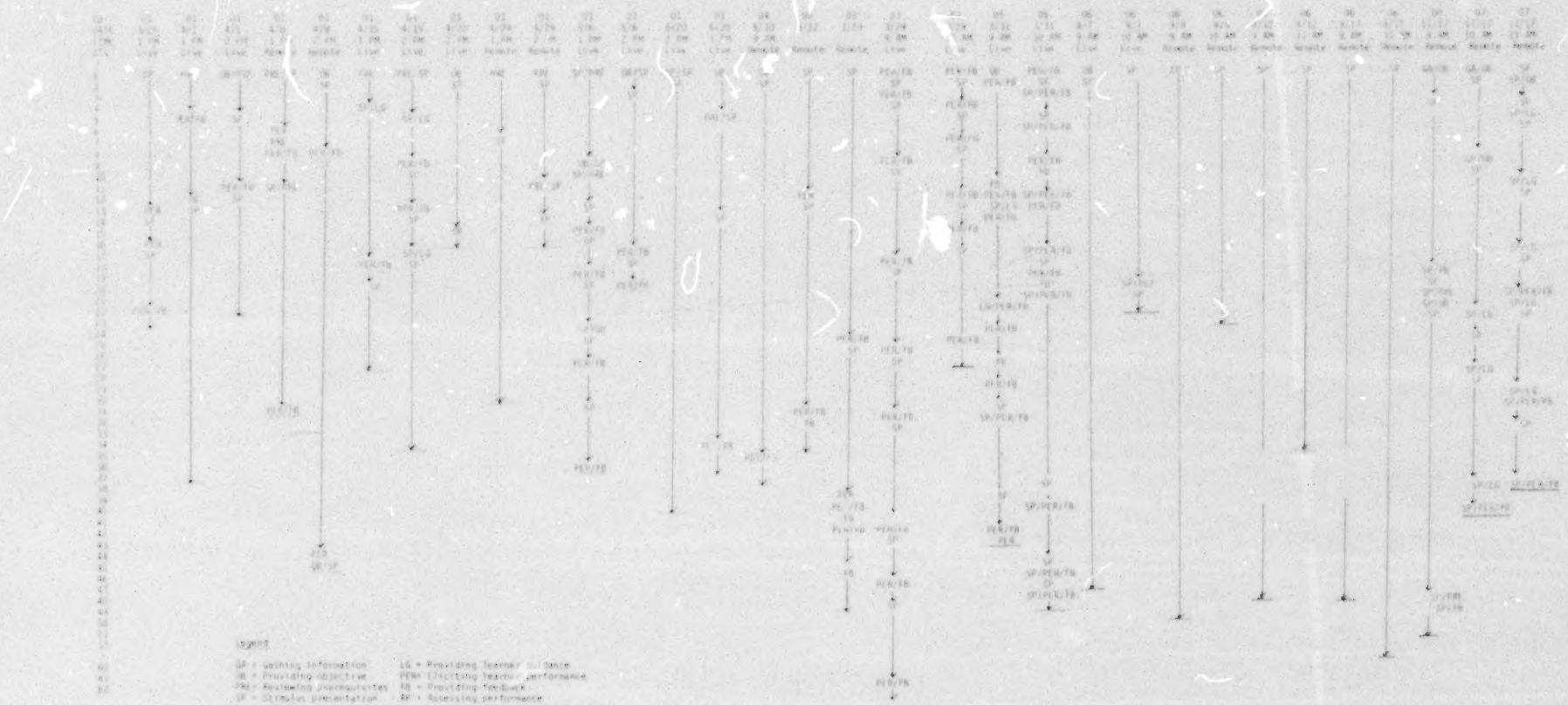

Figure 2

Class Descriptions Presented in Terms of the Occurrence and Temporal Duration of Various Events of Instruction

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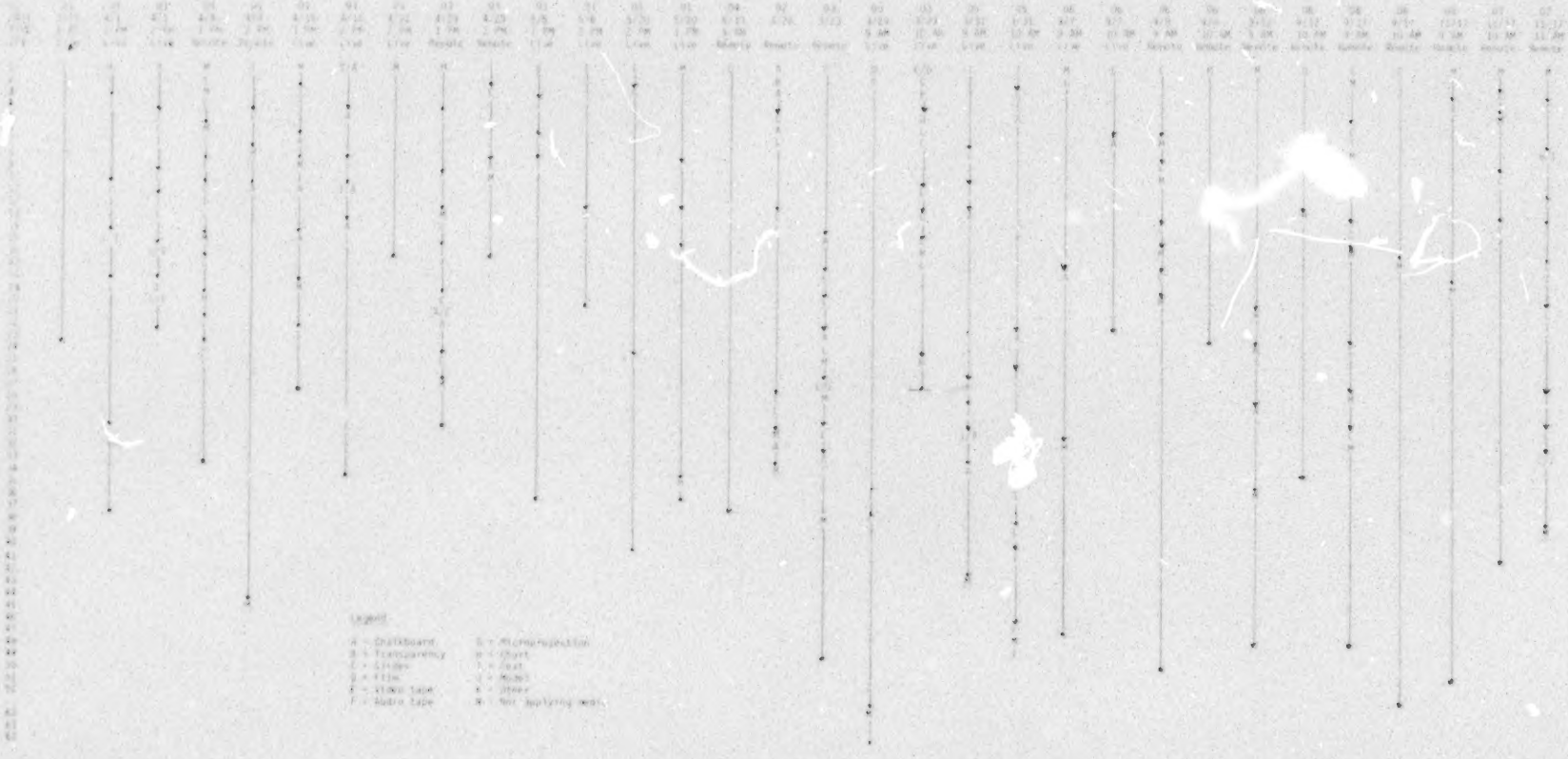

Figure 1

Class descriptions presented in terms of the occurrence and temporal duration of media supports

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